

Instrumentation for Multiple Radiation Detection Based On Novel Mercurous Halides for Nuclear Planetology, Phase II

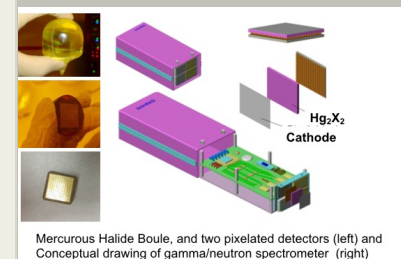
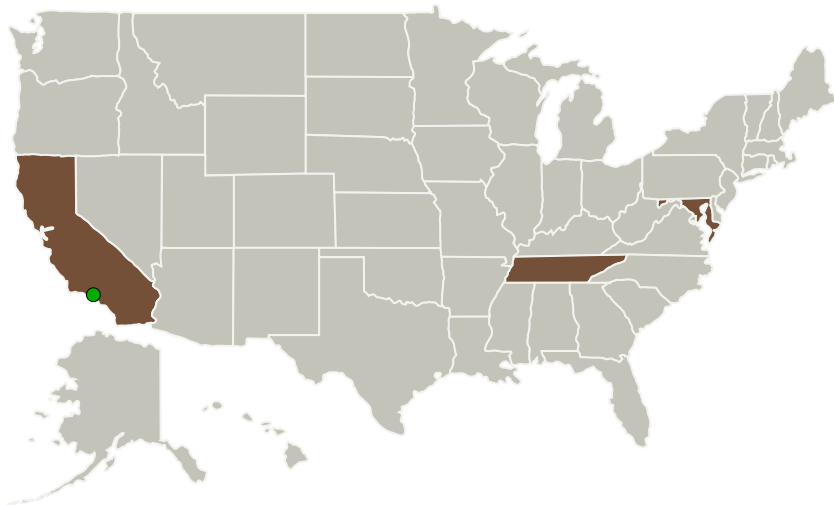
Completed Technology Project (2016 - 2020)



Project Introduction

Radiation detectors that sense gamma and neutron radiation are critical to the exploration of planetary surface composition. Among the key technological challenges is to have a suitable detector that not only can be used for both gamma ray and neutron detection, but also satisfy the many highly desirable and essential for spaceflight properties: good energy resolution, high efficiency, high radiation tolerance, low power consumption, low volume, low weight and operation without cryogenic cooling. We propose a room temperature semiconductor detector (RTSD) using a single material that can detect both gamma radiation and neutron particles. The novel materials we propose are mercurous halides, Hg_2X_2 ($\text{X}=\text{Cl}, \text{Br}$) - mercurous chloride (Hg_2Cl_2) and mercurous bromide (Hg_2Br_2). The development of these spectroscopy grade mercury halide-based radiation detectors are especially relevant to future NASA missions to any solid body in the solar system, including the Moon, terrestrial planets, asteroids, comets, and the moons of the other planets. Our goal is to deliver a breakthrough in detector technology that can lead to spectrometers that are capable of performing both gamma and neutron spectroscopy.

Primary U.S. Work Locations and Key Partners



Instrumentation For Multiple Radiation Detection Based On Novel Mercurous Halides For Nuclear Planetology, Phase II

Table of Contents

Project Introduction	1
Primary U.S. Work Locations and Key Partners	1
Project Transitions	2
Organizational Responsibility	2
Project Management	2
Images	3
Technology Maturity (TRL)	3
Technology Areas	3
Target Destinations	3

Instrumentation for Multiple Radiation Detection Based On Novel Mercurous Halides for Nuclear Planetology, Phase II

Completed Technology Project (2016 - 2020)



Organizations Performing Work	Role	Type	Location
Brimrose Technology Corporation(BTC)	Lead Organization	Industry	Sparks, Maryland
Fisk University	Supporting Organization	Academia Historically Black Colleges and Universities (HBCU)	Nashville, Tennessee
● Jet Propulsion Laboratory(JPL)	Supporting Organization	NASA Center	Pasadena, California

Primary U.S. Work Locations

California	Maryland
Tennessee	

Project Transitions

**September 2016:** Project Start**January 2020:** Closed out**Closeout Documentation:**

- Final Summary Chart(<https://techport.nasa.gov/file/140786>)

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Brimrose Technology Corporation (BTC)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

Sudhir B Trivedi

Co-Investigator:

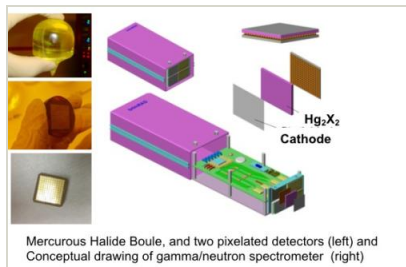
Sudhir Trivedi

Instrumentation for Multiple Radiation Detection Based On Novel Mercurous Halides for Nuclear Planetology, Phase II

Completed Technology Project (2016 - 2020)

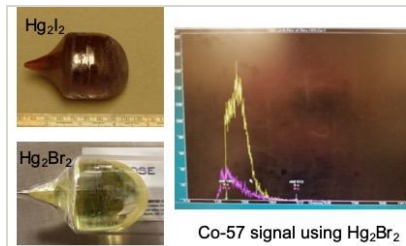


Images



Briefing Chart Image

Instrumentation For Multiple Radiation Detection Based On Novel Mercurous Halides For Nuclear Planetology, Phase II
(<https://techport.nasa.gov/image/128837>)

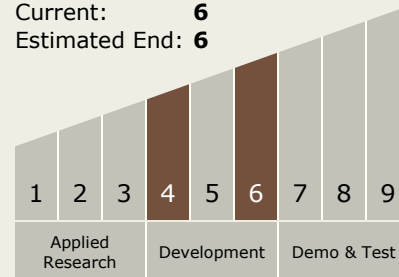


Final Summary Chart Image

Instrumentation for Multiple Radiation Detection Based On Novel Mercurous Halides for Nuclear Planetology, Phase II
(<https://techport.nasa.gov/image/127183>)

Technology Maturity (TRL)

Start: 4
Current: 6
Estimated End: 6



Technology Areas

Primary:

- TX08 Sensors and Instruments
 - TX08.1 Remote Sensing Instruments/Sensors
 - TX08.1.1 Detectors and Focal Planes

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System